Amendments to the Claims

This listing of claims replaces all prior versions and listings of claims in the application. Please amend the claims as follows:

1.   (Amended) A method of performing online valve diagnostics for a valve operating in a process, the method comprising:

obtaining valve information while said valve operates in response to ~~a control signal~~ a plurality of setpoints determined for controlling said process, said valve operating through a series of gradual movements;

said valve information including at least two of setpoint data, position data and pressure data;

deriving at least one of step response, friction and spring range for said valve based on said valve information.

2.   (Amended) The method of claim 1 further comprising:

deriving a model of valve response to setpoint changes in response to said valve information;

adjusting said model in response to error between predictions generated by said model and actual position information; and

applying a step input to said model to generate a step response.

3.   (Original) The method of claim 2 wherein:

adjusting said model includes adjusting a first parameter affecting response time.

4.   (Original) The method of claim 3 wherein:

 adjusting said model includes adjusting a second parameter affecting

overshoot.

5.   (Original) The method of claim 2 wherein:

 said deriving said model includes taking a derivative of a setpoint data and

taking a derivative of position data;

 solving for a set of coefficients that minimizes the error estimating said

derivative of position data from said derivative of input data to define a wavelet;

 said applying said step input to said model includes integrating said

wavelet; and

 deriving response time and overshoot from said step response.

6.   (Original) The method of claim 2 wherein:

 said deriving said model includes obtaining plurality of wavelets in

response to setpoint changes;

 said adjusting includes selecting one of said wavelets with minimal error;

 deriving a step response by applying said wavelet to an impulse; and

 deriving response time and overshoot from said step response.

7.   (Original) The method of claim 1 further comprising:

 deriving a distribution of said position data by transforming said pressure

data and said position data in response to a spring range of said valve;

 determining friction of said valve in response to said distribution.

8.   (Original) The method of claim 7 wherein:

 said determining friction includes determining a difference between an

upper percentile and a lower percentile of said distribution.

9.   (Original) The method of claim 8 wherein:

said upper percentile is 90 percent and said lower percentile is 10 percent.

10.   (Original) The method of claim 7 wherein:

said deriving said distribution includes projecting position data to a
pressure axis along a slope corresponding to said spring range.

11.   (Amended) The method of claim 1 further comprising:

deriving a plurality of distributions of said position data in response to a
plurality of spring ranges of said valve;

selecting one of said spring ranges in response to variance of said plurality
of distributions.

12.   (Amended) A system for deriving valve characteristics of a valve operating in a
process, the system comprising:

a process controller generating ~~control signals to operate~~ a plurality of
setpoints determined for controlling said process, said plurality of setpoints operating said
valve through a series of gradual movements;

a positioner receiving said ~~control signal~~ plurality of setpoints and
generating a signal for positioning said valve;

a controller receiving valve information from said positioner while it is
operating based on the setpoints, said valve information including at least two of setpoint
data, position data and pressure data;

said controller deriving at least one of step response, friction and spring
range for said valve based on said valve information.

13.   (Amended) A storage medium encoded with machine-readable computer program code for deriving valve characteristics of a valve operating in a process, the storage medium including instructions for causing a controller to implement a method comprising:

obtaining valve information while said valve operates in response to a control signal a plurality of setpoints determined for controlling said process, said valve operating through a series of gradual movements;

said valve information including at least two of setpoint data, position data and pressure data;

deriving at least one of step response, friction and spring range for said valve based on said valve information.